Unit 3 Practice Test

Calculations

1) $(27.977 \times .9221) + (28.976 \times .0470) + (29.974 \times .0309) = 28.1$ amu

2) $\dfrac{2.90\text{ g Fe}}{55.85\text{ g Fe}} \left| \dfrac{1\text{ mol Fe}}{1\text{ mol Fe}} \right| \dfrac{6.022 \times 10^{23}\text{ atoms}}{} = \dfrac{3.127 \times 10^{22}\text{ atoms Fe}}{2.60 \times 10^{13}\text{ cells}}$

$= 1.20 \times 10^{9}$ atoms/cell

3) $\dfrac{56.6\text{ g } NH_3}{17.034\text{ g } NH_3} \left| \dfrac{1\text{ mol } NH_3}{1\text{ mol } NH_3} \right| \dfrac{6.022 \times 10^{23}\text{ molecules}}{} = 2.00 \times 10^{24}$ molecules

4) $\dfrac{35.0\text{ g } H_2S}{34.09\text{ g } H_2S} \left| \dfrac{1\text{ mol } H_2S}{} \right. = 1.03\text{ mol } H_2S$

5) $\dfrac{12.8\text{ g}}{.256\text{ mol}} = 50.0\text{ g/mol} = CH_3Cl$

6) $\dfrac{1.008\text{ g H}}{63.02\text{ g } HNO_3} \times 100 = 1.60\%\text{ H}$

7) $\dfrac{103\text{ g } Ca_3(PO_4)_2}{310.18\text{ g}} \left| \dfrac{1\text{ mol}}{1\text{ mol } Ca_3(PO_4)_2} \right| \dfrac{2\text{ mol } H_3PO_4}{1\text{ mol}} \left| \dfrac{97.99\text{ g}}{1\text{ mol}} \right. = 65\text{ g } H_3PO_4$

$\dfrac{75\text{ g } H_2SO_4}{98.08\text{ g } H_2SO_4} \left| \dfrac{1\text{ mol}}{3\text{ mol } H_2SO_4} \right| \dfrac{2\text{ mol } H_3PO_4}{1\text{ mol}} \left| \dfrac{97.99\text{ g}}{1\text{ mol}} \right. = 50\text{ g } H_3PO_4$

10) $\frac{.35\text{g } NaHCO_3 \mid 48.00\text{g O}}{84.01\text{g } NaHCO_3} = 0.20\text{g Oxygen}$

12) $\frac{63.6\text{g Re} \mid 1\text{ mol Re}}{186.21\text{g Re}} = \frac{.3415\text{ mol Re}}{.3415} = 1$

$\frac{36.4\text{g Cl} \mid 1\text{ mol Cl}}{35.45\text{g Cl}} = \frac{1.027\text{ mol Cl}}{.3415} = 3$

$ReCl_3$

13) $12.01 + 1.008 + 35.45 = 48.468$ g/mol

$\frac{290.8}{48.468} = 6$

15) $\frac{2.58\text{g } H_2O \mid 2.016\text{g H}}{18.016\text{g } H_2O} = \frac{.2887\text{g H} \mid 1\text{ mol H}}{1.008\text{g H}} = \frac{.286\text{ mol H}}{.0479} = 6$

$\frac{6.32\text{g } CO_2 \mid 12.01\text{g C}}{44.01\text{g } CO_2} = \frac{1.725\text{g C} \mid 1\text{ mol C}}{12.01\text{g C}} = \frac{.144\text{ mol C}}{.0479} = 3$

$= \frac{.7663\text{g O} \mid 1\text{ mol O}}{16.00\text{g O}} = \frac{.0479\text{ mol O}}{.0479} = 1$

empirical formula = C_3H_6O (mass = 58.08 g/mol)

molecular formula is between 100 - 150 so it must be double

$C_6H_{12}O_2$

16. $C_2H_4 + 3O_2 \longrightarrow 2CO_2 + 2H_2O$

$$\frac{125\ g\ C_2H_4 \mid 1\ mol \mid 2\ mol\ CO_2 \mid 44.01\ g}{28.05\ g \mid 1\ mol\ C_2H_4 \mid 1\ mol} = 392.2\ g\ CO_2$$

20. $$\frac{1\ mol\ Fe \mid 3\ mol\ CO \mid 1\ mol\ O_2}{2\ mol\ Fe \mid 2\ mol\ CO} = .75\ mol\ O_2$$

21. $$\frac{1\ mol\ C_6H_{12}O_6 \mid 2\ mol\ C_2H_5OH \mid 46.07\ g}{1\ mol\ C_6H_{12}O_6 \mid 1\ mol} = 92.14\ g\ C_2H_5OH$$

$$\frac{46\ g}{92.14\ g} \times 100 = 50\%\ yield$$